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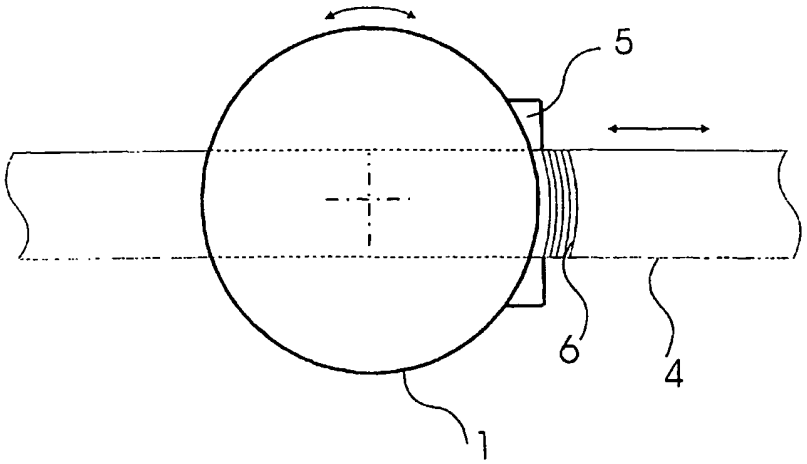


(57) Abstract: Information record is stored and read on the tape /4/ with optically active layer so that at least one storing and/or recording beam /3/ rotates above the tape /4/, perpendicularly to the tape /4/ and in parallel with the axis of rotation, with the radius of rotation larger than half of the optically active layer on the tape /4/, while the tape /4/ moves straight in the direction along its length. Record is distributed into discontinuous sectors /6/ of tracks in the shape of arcs. Device for carrying up the method has rotating recording head /1/, where the source/reader /2/ is placed for transmission of the beam /3/ in a way according to the invention, whereas the tape /4/ is seated movably, with straight part for the corresponding section /6/ of the recording track, which is perpendicular to the direction of incidence of beam /3/. Preferentially, the tape /4/ is double-sided and the sources/readers /2/ are at least four and are located in pairs, positioned in balance, which are directed for double-sided transmission of beams /3/ to the tape /4/ and fitted with slot /7/.

WO 02/09099 A1

DATA RECORDING AND READING METHOD AND DEVICE

Field of the invention

The invention is related to the field of multimedia and computer applications, namely those utilising optically active layer for reading and storing the recording. Method of storing and reading of the information record with the help of specific co-ordination of movement of the optical layer carrier in the form of tape, and modulated optical radiation beam, generally the laser one, is designed. Simultaneously, constructional solution of storing and reading device is designed, allowing performance of this method, where combination of arrangement of recording head and source/radiator towards the carrier is resolved.

Present state of the art

At present, the method of storing and reading of the information record, as well as the devices for performance of this method differs congenitally, especially depending on the form of the information record carrier. In the case of the present computer memory unit, magnetic tapes, floppy or hard magnetic disk, various forms of optical disc, generally known as CD-ROM, optical plastic cards etc. are used for information recording. On the other hand, in the case of various forms of audio-visual devices, cassettes with magnetic tape of various length or discs in the form of CD-disks, CD-minidisks, and DVD-type disks are utilised for information recording. The most intense development and spreading takes place in the case of carriers in the form of discs, for instance DVD disks for laser recording in several layers are considered to be the top medium with the maximal capacity achieved. Development of carriers and corresponding technology is focused primarily on achievement of the highest possible capacity for the information recording. Capacity of one DVD-disk with two-side recording is close to 28 GB, and hard disks are reaching capacity around 10 GB. Carriers are equipped either with the optically active layer or with the layer of magnetic material; or are manufactured

directly from these materials (CHIP WEEK No.: 34, 350, 1998). For carriers in the form of disks, the optical principle, when carriers are equipped with optically active layer, as well as the magnetic principle, when the carriers are equipped with magnetic layer, are used. Carriers in the form of tape are common only with the magnetic layer. Disadvantage of these carriers is that they have relatively low capacity. Magnetic tape units in computers are reaching significant values of the stored data capacity only with the tape length of many hundred meters, which means also long data access time.

Reading and, as the case may be, recording of the information requires device equipped with reading and possibly recording head. This head is of magnetisation type, equipped with magnetisation source for carriers with magnetic layer, or the laser one, equipped with source/radiator of at least one laser beam for carriers with optically active layer. In the case of optical devices, contact between the head and the optically active layer medium does not take place as a rule, and the coupling is mediated by the laser beam. In the case of magnetic devices, magnetic media are employed and the recording head is in direct contact with the medium or separated with extremely thin air cushion.

In the case of all devices for carriers in the form of disks, magnetic as well as optical ones, the arrangement of the device is derived from the principle of rotational movement of the carrier. The information is deposited on the carrier in circular concentric tracks or continuous spiral track. The recording head is mounted in the device in a sliding manner, whereas the carrier is seated rotationally. During the process of reading and storing the information record, the recording head is performing sliding movement in direction of straight line whereas the carrier rotates around its axis. That means that in the case of magnetic media, the recording head slides with its part on the surface of the rotating magnetic disk. In the case of optical devices, the optical radiation source/radiator emits beam with different pre-set angle, and this beam shifts above rotating optically active layer and impinges on its surface without leaving it and simultaneously creates or reads continuos tracks shaped in arrangement of concentric circles or one spiral. Disadvantage of these devices is limited capacity of the carrier given by disk dimensions.

Devices for card-shaped carriers with higher memory capacity are the optical ones. On the carrier, rectangle-shaped optical layer exists with straight tracks leading longitudinally and arranged beside one another in parallel. Card with circular optically active layer, with tracks in the shape of continuous circles or continuous spiral and in the shape of cut circular layer, with discontinuous tracks in shape corresponding to the way of cutting, with keeping the circular essence of their structure has been described in the WO 00/36554. For the card with straight tracks, the device for storing and reading the record has the recording head mounted immovably or in a sliding way, and the carrier is seated movably. During reading and storing the record, the recording head is either non-moving or it is moving in the direction of a straight line whereas the carrier moves in the direction of a straight line. Thus, during the process of storing and reading the record, the optical beam is either immovable or it is moving along the straight line. Device for storing and reading the record for the card according to the WO 00/36554 and the storing and reading process are similar to the optical CD drives. Disadvantage of these devices is a small capacity given by the small size of the card.

Devices for the tape-shaped carriers are usually only the magnetic ones. Tape-shaped carrier with thin layer of magnetic material applied on the tape, sometimes on both sides, is used. The tape is used namely for audio and video devices. In the case of audio devices such as tape recorder, the recording and reading head is mounted immovably in the device, whereas the tape is placed on at least one rotating reel and situated so that it is adjacent to this head and slides in its longitudinal direction in the area of storing and reading the record. Contact of both surfaces is reached by system of supporting pins and forked grips. The head is not moving during storing and reading the record, whereas the tape is sliding on the head's contact part in the direction of its longitudinal dimension. In the case of other devices such as videorecorder, the recording and reading head is mounted on a rotary drum with the rotation axis at an angle against the contact area on the tape surface. During storing and reading the record, the head is rotating on the drum and simultaneously it is touching the tape continuously, whereas the tape is sliding in its longitudinal direction across the head's contact part. Mutual contact takes place all the time during storing and reading the record, when the contact is

allowed namely by the adapted shape of the head and oblique slope of the drum's rotation angle towards the tape. This results in the information recording into slope discontinuous record track leading across the magnetic layer surface on the tape. The angle formed by the recording track segment in the surface layer of the tape is given by the angle formed by the drum's rotation axis and the tape edge. Capacity of the tape is limited by tape length and is given in minutes or hours according to the operational capabilities.

Specific optical device arranged for contact of recording head with the tape, similarly to the magnetic devices, is described in the EP 0430799. Device for recording to the optically active layer coating one side of a tape is described. The device has rotational recording head in a form of cylindrical drum rotating along its axis. The tape is wound in a spiral on this drum. The tape is equipped with optically active layer on its face side so that the face side rests on the lateral area of a cylinder drum of the recording head. The drum is equipped with emitting opening from which the laser beam is radially emitted for information recording on the tape. During the rotation of the head drum, when the tape wound on this drum simultaneously shifts, creation of record takes place in the area of contact of the tape and opening with emitted beam. Record tracks created in this way are in shape of system of parallel oblique lines on the tape, arranged in the predominantly longitudinal direction with regular gaps between them. This paper documents attempts to use optically active layer on a carrier in the shape of a tape. However, described method of storing and reading the record with the help of radially emitted beam impinging the moving spirally wound tape shifting across the recording head is not bringing dramatic increase of capacity possibilities for recording compared to results usually accomplished today for instance by disk DVD drives. The basic drawback of this solution is enormous technological demand on the device that would allow realisation of the aforementioned method of recording based on extraordinarily complicated system design. For the device to be able to radially transmit the beam from cylindrical surface of the recording head, complicated optical system is designed, mounted as self-standing unit outside the head, containing beam source/reader, mirror for bending the beam, distributing prism, and galvanometric mirror with complicated control system, when

both optical system and head are each equipped with its own drive unit, and are rotating in a precisely set angle against each other, while the head rotates with half the speed of the optical system. Maintaining the precise and stable position of the spirally wound tape on the recording head is also complicated and very precision-demanding, because slipping of the tape in any direction would result in unreadable record. Therefore, rewinding the tape to other section is not easy as well, and tape utilisation on both sides is out of the question. The device mentioned above is hardly to realise because of its complexity and there is no precondition of its broader use.

Essence of the invention

The disadvantages described above are eliminated by the solution according to the invention. According to the invention, recording and reading is performed on a tape equipped with layer of optically active material or consisting of optically active material, where the method of storing and reading the information record allowing use of this tape in optical system as well as constructional arrangement of reading and storing device for utilisation of the proposed method are solved, and that on the level allowing utilisation in multimedia and computers. Storing and reading the record according to the invention are performed on a tape equipped with optically active material at least on the tape surface so that the optically active layer for storing and reading the record has the resulting shape of strip, length of which is given by the tape length or, as the case may be, by the length of optical layer applied on the tape, if the former does not cover all length of the tape. The way of storing and reading the information record is solved, taking into consideration thus selected shape of the active layer on the optical principle. The essence of the invention is based on that that storing and reading the record is performed by mediation of at least one rotating beam of optical radiation, usually the laser one, while the optical radiation impinges in a point manner to a certain plane of the optically active layer of the tape, when this point of incidence is moving along the straight plane of the optically active layer on the tape along the path of curve. In this way, the optical record is created or read, which is decomposed into the

record track corresponding to this path of movement of the point of incidence of the radiation. The tape, and the optically active layer together with the tape, is moving along its length with its section, where reading or storing the record currently takes place, during the storing and reading the record, so that the straight movement of tape is combined with rotational movement of the optical beam. During storing as well as reading of the record, the optical radiation beam is transmitted in parallel with its rotation axis and impinges perpendicularly to the optically active layer. Radius of the beam rotation is bigger than half the width of the optical layer on the tape, and the tape moves in such manner that it is set to the position in which the beam impinges the tape only for certain duration from each period of its rotation, that means the time less than half-period time of its rotation. As a result of the above described movement conditions for the movement of the writing and reading beam, effect of the beam onto the optically active layer on the tape takes place only for certain time interval from each period of its rotation. This movement of the beam can be easily imagined so as the beam would be a perpendicular line moving along the circular path above the flat incidence surface of the optically active layer of the currently exposed part of the tape, thus circumscribing lateral area of an imaginary cylinder when the tape runs through the base of this imaginary cylinder. Since the tape is moving during the process, and the optical beam affects the optically active layer during each rotation period only for the duration less than duration of half-period of its rotation, the beam is acting on the optically active layer only during maximally half of its circular path, and thus created or read record is stored on or read from the tape in a curve-shaped segments which are located on the tape in succession with regular distances. The method of storing and reading the information record according to the invention allows creation and reading the information record in a digital form with capacity which is the same or higher than capacity of DVD disks or rewritable CD-ROM disks. The invention thus overcomes the prejudice which is, based on the magnetic tape layer properties, generally accepted at present time that the technical possibilities of tape-shaped carriers has been exhausted already, and orients development of recording and reading methods in a new direction based on movable rotating recording beam. Simultaneously, the invention overcomes all

possibilities of the tape for optical recordings described in the EP 0430799, namely by that it allows implementation with the help of relatively simple device, and increases more than hundred times the existing capacity possibilities of the information recording on carriers. Precise co-ordination of movements and angles is necessary during the process of storing and reading the record on the tape. Precise positioning of the corresponding surface part of the optically active layer in the moment of optical beam impact is essential as well. During storing and reading the record, the surface of the optically active layer must be set to such position, that the whole part of tape where the radiation currently impinges to the area of sector of the recording track, i.e. the whole corresponding tape part of the currently created or read sector of the recording track, is flat and perpendicular to the impinging beam. This is very significant because any unevenness on the tape, e.g. its corrugation or local bending on the just created track section, could lead to impossibility of repeated reading of the stored information if this would happen during information storage, or it would cause impossibility or inaccuracy in the information reading, if this would happen during the process of reading the record.

The information recording according to the invention can be performed in two alternatives. The first possibility is that the tape with optically active layer does not move during the record creation or reading, and recording or reading takes place so long, until the point of impinging radiation circumscribes a circular arc in the corresponding plane of incidence at the optically active layer on the tape, whereupon, after completion of recording to or reading of one such created or read section of the recording track, the tape as well as the optically active layer moves against the rotation axis by one adequate step in longitudinal direction relatively to the tape shape; whereupon the process described is repeated. That means that recording or reading of the information takes place discontinuously i.e. stepwise. Result of combination of these movements is that arc-shaped sections of recording tracks are created on the tape, and these sections are stored in regular intervals one behind the other.

The second possibility is that the tape together with the optically active layer moves in the longitudinal direction during the record creation or reading. In this case, the point of incidence of the optical radiation circumscribes on the tape in the

optically active layer curved arc shaped curves that are result of combination of sliding movement of the optically active layer and rotational movement of the beam. These curves are, as in the first variant, stored in succession in identical shape and in regular intervals.

Process of storing and reading of the record according to the invention is preferentially designed for utilisation of the tape on both sides. The invention allows using of double-sided tape when the tape is equipped with the optically active layer on both sides, or the whole tape is manufactured from the optically active material. Than, during the process of storing and reading the record, both sides of the tape can be used simultaneously or sequentially, so that the radiation is transmitted via at least two simultaneously or sequentially transmitted beams oriented in opposite direction one against the other, when they are pointed each one to one side of the tape, into different planes of the optically active layer.

The device for performance of the method according to the invention is the reading and, as the case may be, simultaneously recording device for reading and, as the case may be, storing of the information record into certain plane of the optically active layer on the tape. It contains basic elements of the existing optical devices, which are the recording head mounted rotationally around its axis, and at least one source/reader for transmission of at least one beam of optical radiation, and further the mounting and positioning jig for mounting and positioning the tape with optically active layer during reading and storing the record. The optically active layer is located on the tape with optically active material on at least one surface side and is, as the case may be, removable from the device. According to the invention, the source/reader is seated in the device rotationally whereas the tape is seated in a sliding way in the longitudinal direction. The source/reader of the optical radiation is located in or on rotational recording head out of its rotational axis and it is fixed in the distance from the rotation axis which is larger than half of the width of the optical layer on the tape. Simultaneously, it is set in the position for transmission of the beam in the direction parallel with rotation axis and perpendicular to the part of the tape set in the device for action of the beam in the given moment. Rotation axis of the optical beam is therefore identical with the rotation axis of the recording head. At the same time, the tape is placed with its

part for the just read/created recording track section movably in a straight longitudinal direction and so that its part for impinging of the optical radiation beam crosses the circular path of the beam only one times. Rotation of the source/reader inducing rotation of the beam with certain radius of rotation is allowed by rotational mounting of the recording head in the device. This recording head is for instance in the form of rotating arm or rotating drum. The recording head thus created optimally allows needed rotation of the source/reader of the optical radiation and its positioning into position allowing the beam transmittance in a way according to the invention. Because the source/reader of the optical radiation must be set in the position for the beam transmission in the direction parallel to the rotation axis and perpendicular to that part of tape which is intended for impinging of this beam, the plane of rotation of the source/reader of the optical radiation as well as the plane of rotation of any point of the recording head are planparallel with the plane of surface of that part of the tape which is exposed for impact of the optical beam. The tape part exposed for impact of the optical beam must be perfectly flat because of precision for reproducibility of reading the stored record, which is reached for instance when it is resting on adequately shaped support.

The recording head can be preferentially equipped with at least two sources/readers oriented against each other, and the gap for tape is located between them in the plane perpendicular to the rotation axis. This allows double sided utilisation of the tape, of course, provided the optically active layer is located on both sides of the tape.

The recording head can be even more preferentially equipped with at least two pairs of sources/readers that are placed on the head in balanced position. In this case, it has shape of drum on which four, six, eight etc. sources/readers are located, which are arranged in pairs with central gap for the tape, where the weight equalisation of pairs allows long-term high speed rotation without sway and risk of irregularities. This arrangement can be considered optimal among all possible variants of implementation of the invention, because it allows maximal increase of the tape capacity and speeding up of the access to the stored information as well as speeding up of the very storing of the information. Than, the information record

can be, for instance, stored into different planes of the optical layer one above the other. Larger number of sources can be also utilised for synchronisation of the record.

Beside the recording density, memory capacity can be influenced by length of the recording tape e.g. in one cassette. In comparison with magnetic tapes, the tape feed speed does not influence quality of the recording and can be relatively very slow, of the order of 1 mm/sec. Optical cassette with tape dimensions corresponding to the S-VHS type magnetic tape cassette is capable, according to the optical layer thickness, to store capacity of dozens of optical discs; while the data access time will be of the order of one tenth lower than in magnetic tape units. One cassette of dimensions standard for the VHS videorecorder, charged with adequate length of tape for optical recording is capable, utilising solution according to the invention, to store memory capacity of the order of TB. The invention is suitable for utilisation in the field of data files and networks for computers and controlling technology, but also in other fields of multimedia technology such as video and audio recordings.

Review of figures on drawing

The invention is explained in details by drawings, where device for storing and reading the record according to the invention equipped with one source/reader is illustrated in the top view on Fig. 1, the same device in the front view is illustrated on Fig. 2, device for storing and reading the record with two sources/readers situated against each other is illustrated in the side view on Fig. 3, the same device in the front view is illustrated on Fig. 4, the device for storing and reading the record according to the invention equipped with four sources/readers situated against each other is illustrated in the side view on Fig. 5, the same device in the front view is illustrated on Fig. 6.

Examples of embodiment of the invention

Example 1

Exemplary embodiment of the invention is the optical recording and reading device according to the Fig. 1 and Fig. 2, and process of information recording and reading allowed by this device.

The device has rotating recording head 1 in which the source/reader 2 of the optical device is mounted. The source/reader 2 is set in the position for transmission of beam 3 in the direction perpendicular to the optically active layer. This optically active layer is located on the tape 4 seated with its part, currently exposed for incidence of the beam 3, movably in the direction indicated by the arrow, i.e. along its length. The recording head 1 is in the shape of drum which axis of revolution is parallel to each of the beams 3 in any rotational position of the source/reader 2. The tape 4 is located, at least with its part for incidence of the beam 3, in the position perpendicular to the axis of revolution as well as to each of the beams 3. Perfect straightening of this part of the tape 4 is reached with the help of the bearing 5, having straight surface plane and peripheral leading grooves that are not shown, corresponding to the breadth of the tape 4, and fitting to it on the side opposite to the side on which the beams 3 are acting. In this exemplary embodiment, the axis of revolution of the recording head 1 is placed optimally, that is to the centre of the breadth dimension of the tape 4, which gives the shortest possible path for created segments 6 of the record track.

Method of recording and reading of the information according to the invention can be illustrated through the agency of processes taking place during utilisation of this exemplary embodiment.

For the process of recording and/or reading of the information record, the recording head 1 is put into movement. It starts to circumgyrate in a high speed, simultaneously, the source/reader 2 located on it rotates, so that the axis of revolution of the recording head 1 as well as that of the source/reader 2 are identical. The source/reader 2 transmits, that is scans and/or emits, narrow bundle of mutually parallel laser rays, i.e. beams 3. These beams 3 are parallel not only mutually, but also to the axis of revolution. As a consequence of source/reader 2

rotation, the beam 3 is rotating simultaneously above the exposed part of the tape 4, which is in perfectly flat position because it is supported by the bearing 5. Recording and/or reading of the information starts in the moment when rotating beam 3, transmitted from the source/reader 2, hits the optically active layer on the tape 4. As the point of incidence of the beam 3 moves as a result of rotational movement on the tape 4 surface, it circumscribes certain path there inducing simultaneously reaction of the optically active layer in its specific plane, thus creating and/or reading sector 6 of the record track.

If the tape 4 moves stepwise, it is immovable during the time when it is affected by the beam 3 creating or reading sector 6 of the record track. Than, the tape 4 moves in the remaining time of the period of beam 3 rotation, before repeated action of the beam 3 and creation or reading of the next sector 6 of the record track takes place. Stepping must be adjusted very precisely so that shift of the tape 4 is uniform, always by the same section. This is accomplished by mounting of suitable advanced and reliable stepping or jogging element to the part of the device for the tape 4 movement. During the uniform stepwise movement of the tape 4, creation of regular arc segments 6 of tracks takes place, having shape of circular sections located on the tape 4 in succession with gaps corresponding to the length of the tape 4 shift during the time between action of beam 3, where centres of these circles are on the straight line running through the centre of the tape 4. Exemplary shape of such track sectors 6 is visible at the illustration on Fig. 2.

If the tape 4 moves uniformly, advancing in the direction along the tape length during all time of realisation of the method according to the invention, during the time when the beam 3 affects it and creates or reads sector 6 of the record track, as well as during the remaining part of the period of beam 3 rotation before repeated action of beam 3 and thus creation or reading of next sector 6 of the record track. Achievement of uniform motion of the tape 4 is not so difficult technically as stepping described in the previous paragraph. Uniform motion of the tape 4 for the whole time of the process of recording and reading the of the information results in creation or reading of arc-shaped segments 6 of tracks having shape of curves of identical shape and are located on the tape 4 in

succession with identical gaps. They correspond to the combination of rotational movement of the beam 3 and shift of the tape 4 during the time period between the action of beams 3.

In both cases, the track is discontinuous, the relevant sector 6, and also the recording and/or reading of the information, ends in the moment when the beam 3 leaves the optically active layer as a consequence of its rotation. Continuous recording or reading of the information is than accomplished by suitable combination of hardware and software, and so the user will not experience any discontinuity of the record in any way.

Example 2

Other exemplary embodiment of the invention is the device according to the Fig. 3 and 4.

The recording head 1 is in the form of revolving arm equipped with two sources/readers 2', 2". These arms are arranged on the recording head 1 in pair and are mounted against each other, and the gap 7 for the tape 4 is located between them. The sources/readers 2', 2" are aimed for transmission of beams 3 along the same straight line, but in the opposing orientation, against each other. The tape 4 is double sided, when it consists of plastic carrier equipped on both sides with the optically active layer. It is positioned between sources/readers 2', 2" via the gap 7, in the position perpendicular to the axis of revolution and simultaneously perpendicular to the direction of impinging beams 3. This allows the beams 3 from each of these sources/readers 2', 2" to be transmitted each one to one side of the tape 4, i.e. each one to one of the two opposite flat surface planes of the optically active layer on the double sided tape 4. Thus, double-sided utilisation of the tape 4 is possible without the need of its reversal, as described further. On the contrary to the previous example, the axis of revolution of the recording head 1 and of revolution of the sources/readers 2', 2" does not intercept the tape 4.

The device works in a similar way as the previous one, with that difference that sectors 6 of the discontinuous recording track are of different shape. In the case of

stepwise motion of the tape 4, these sectors 6 are in the shape of arcs having centre outside the tape 4, as illustrated on the Fig. 4. Further difference follows from the arrangement of sources/readers 2', 2" in pair. These sources/readers 2', 2" can operate alternatively, when the first source/reader 2' is operating during the reading or recording of the information on one side of the tape 4, whereupon, for instance after exhausting the capacity on this first side of the tape 4, the operation continues with the help of the second source/reader 2" on the second side of the tape 4. The invention does not exclude in any way the possibility that both sources/readers are operating simultaneously, than, reading and/or recording of the information takes place on both sides of the tape 4.

Example 3

Other exemplary embodiment of the invention is the device according to the Fig. 5 and 6.

The recording head 1 is in the form of revolving drum equipped with four sources/readers 2 in total. The sources/readers 2 are seated in the recording head 1 where they are arranged in two pairs. In each of these pairs, the sources/readers 2 are arranged against each other and pointed for the direction of transmission of beams 3 in one straight line, but in opposite direction. The gap 7 for the tape 4 is passing through the central part of the recording head 1 between the sources/readers 2 pointed against each other. In this case, the gap 7 is in the shape of slot created in the recording head 1 perpendicularly to the axis of rotation, with parallel straight planes for the tape 4. Pairs of sources/readers 2 are seated in balanced position when they are located on the opposite sides of the recording head 1 , which allows even distribution of gravitational forces which is important namely during the recording head 1 rotation.

The device works in a similar way as the previous one, with that difference that writing or reading of two sectors 6 of the recording track on each side of the tape 4 takes place during one revolution of the recording head 1.

This construction allows creating or reading of double-sided record on the tape 4 and maximum support for the speed of the information reading or recording.

C L A I M S

1. Method of storing and reading record, when the information record is stored in the optically active layer on the tape or is read from it, and storing as well as reading is performed by the action of optical radiation transmitted in the form of at least one aimed beam impinging pointways in the perpendicular direction into specific plane of optically active layer on the tape and this point of incidence is moving on the optically active layer thereby creating or reading record distributed into discontinuous record track, which shape corresponds to the trajectory of the point of incidence of the beam in the optically active layer, when the tape shifts in the longitudinal direction in the time duration between starting and completion of the process of storing and reading of the record *characterised by that* during storing and reading of the record, the beam of optical radiation rotates so that it is transmitted in parallel to the direction of the axis of this rotation while circumscribing the imaginary lateral area of a cylinder when the radius of the beam rotation is larger than half of the breadth of the optical layer on the tape, whereas the tape is positioned, with all its part for currently created or read sector of record track, into flat position with its surface perpendicular to the direction of the beam impingement, when, during its rotation, the beam is impinging to the optically active layer only for specific time less than half-period of its rotation, whereby creating or reading the record which is distributed on the tape in sectors in shape of curves arranged successively in regular intervals.

2. Method of storing and reading record according to the claim 1, *characterised by that, that* during recording or reading, the tape does not move and recording or reading continues until the point of impinging light circumscribes circular arc in the plane of the optically active layer, then, after completion of recording or reading of one such created or read sector of the record track, the tape advances relatively to the rotational axis by one adequate step in the direction of tape length, and then the process described is repeated.

3. Method of storing and reading record according to the claim 1, *characterised by that, that* during recording or reading, the tape moves continually and the point of impinging light moves in the plane of the optically active layer in curves which are the result of combination of sliding movement of the tape and rotational movement of the beam.

4. Method of storing and reading record according to the claim 2 or 3, *characterised by that, that* the radiation is transmitted in the number of at least two beams which are transmitted from two sides and in the direction oriented in opposition towards each other, so that the beams are impinging to the opposite sides of the tape with optically active layer.

5. Device for execution of the method according to some of the claims 1 through 4, which is reading and, as the case may be, recording device for reading and, as the case may be, also storing of the information record into specific plane of optically active layer on the tape, where this device includes recording head mounted on supporting body rotationally around its axis, and at least one source/reader for transmission of at least one beam of optical radiation, where this source/reader is positioned in position for transmission of the beam in the direction perpendicular to the part of the tape for reading or recording of information, while the tape is seated in the device movably lengthways in the direction of its axis an is fitted with optically active material on at least part of its at least one side, *characterised by that, that* the tape /4/ is seated with its part for currently read/recorded sector /6/ of the track movably in the straight direction and this part is located in the flat position with surface perpendicular to the direction of optical radiation incidence whereas the source/reader /2/ of the optical radiation is mounted on the recording head /1/ out of its axis of rotation, in the position for transmission of beam /3/ in parallel with the axis of rotation of the recording head /1/ and in a distance, relative to this axis, larger than half of the breadth of optically active layer on the tape /4/, while the part of tape /4/ positioned for impingement of beam /3/ intersects once the circular path of the beam /3/ impingement.

6. Device according to the claim 5, *characterised by that, that* the rotating recording head /1/ is fitted with at least two sources/readers /2/ which are arranged in pair in which they are mounted against each other and directed for transmission of beams /3/ in the opposite direction from diametric sides, and between them in the plane perpendicular to the axis of rotation, the slot /7/ for tape /4/ is located, while the tape /4/ contains optically active layer on both sides.

7. Device according to the claim 6, *characterised by that, that* the rotating recording head /1/ is fitted with at least two pairs of sources/readers /2/ which are placed on the head /1/ in balanced position.

Fig. 1

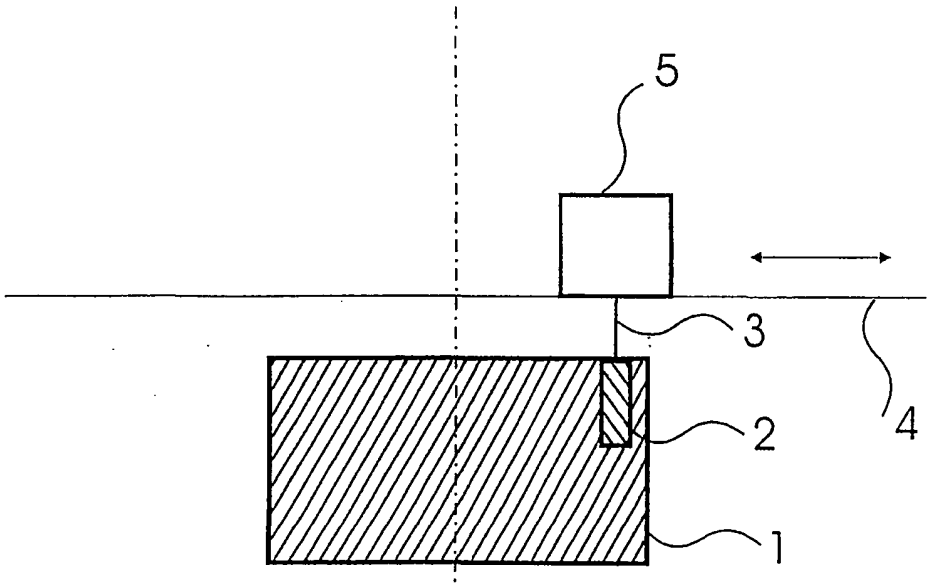


Fig. 2

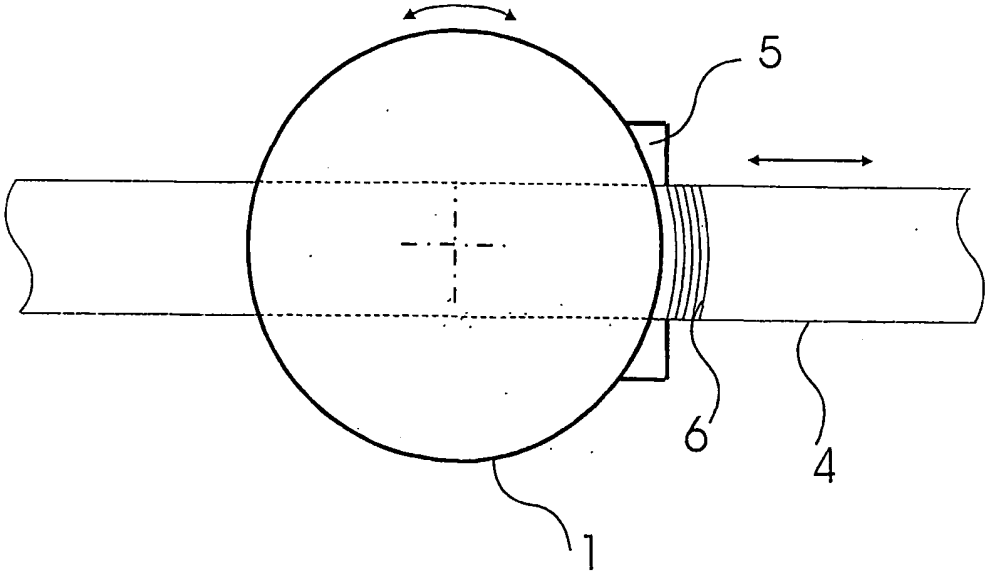


Fig. 3

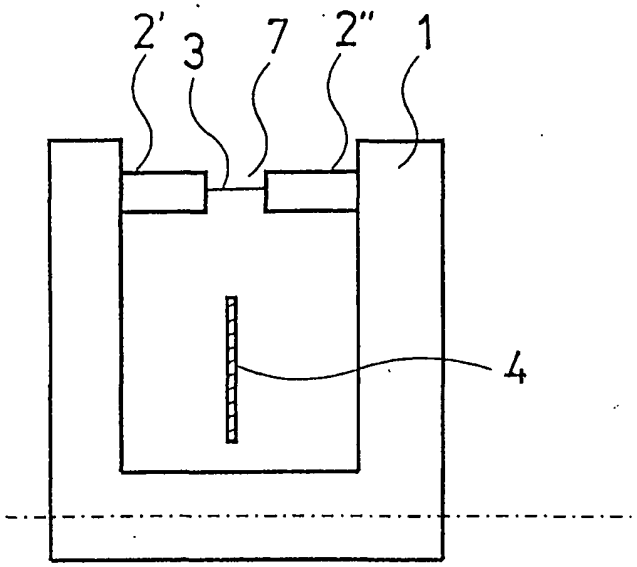


Fig. 4

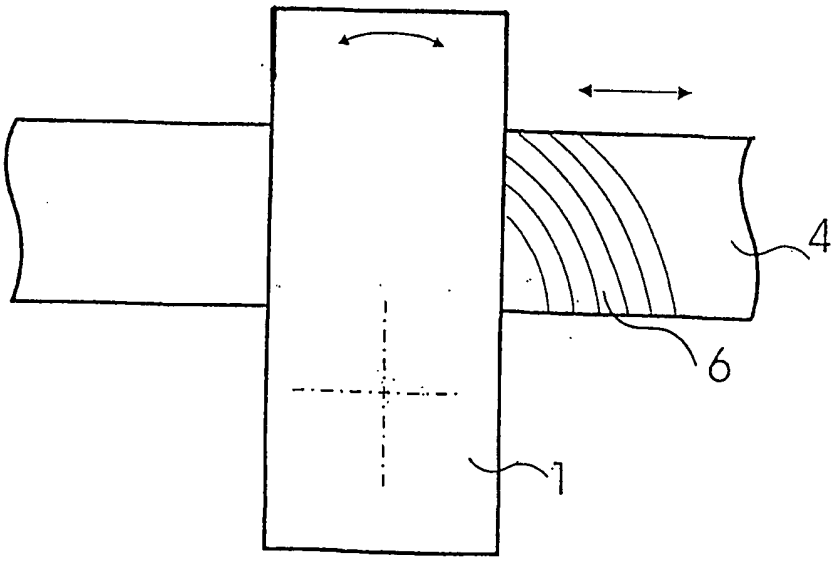


Fig. 5

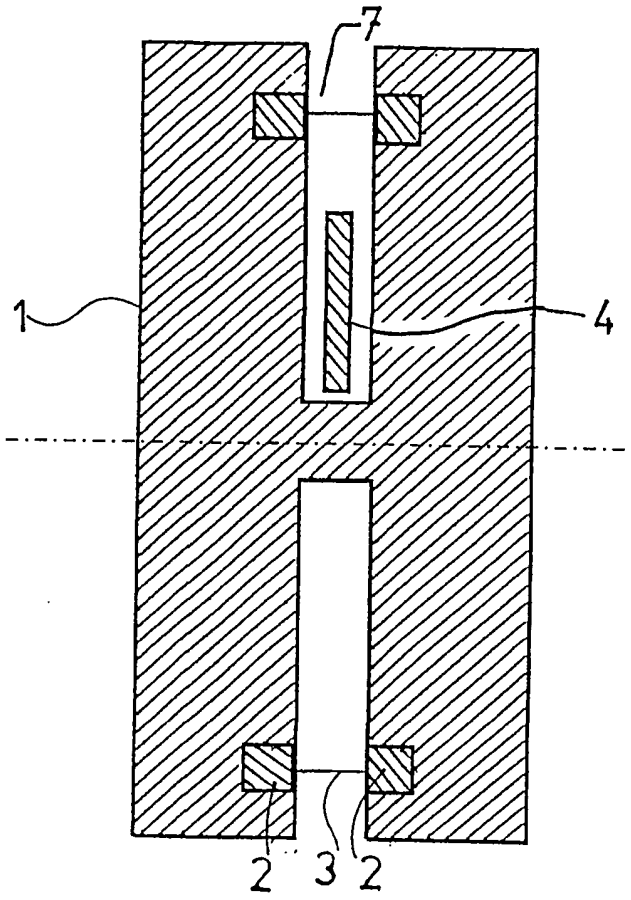
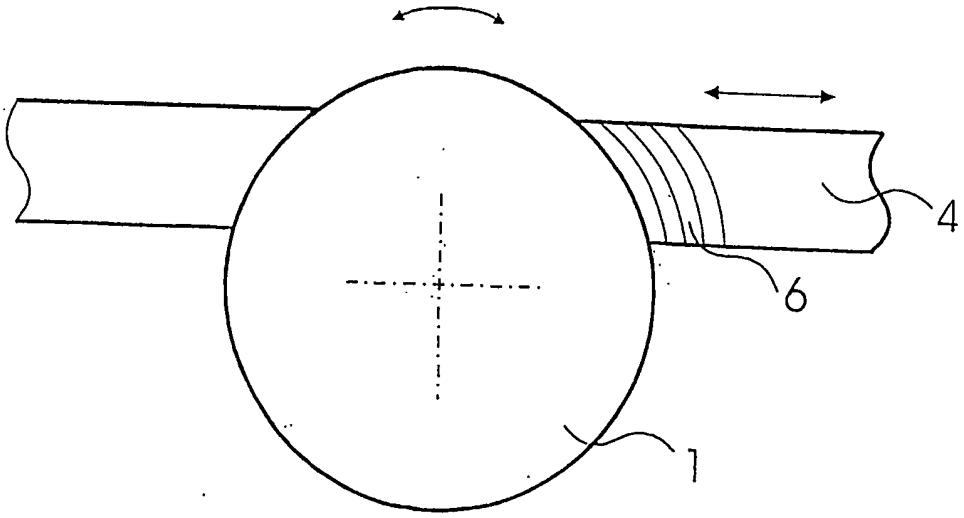


Fig. 6



INTERNATIONAL SEARCH REPORT

Intern[redacted]al Application No
PCT/CZ 00/00053

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G11B7/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G11B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 673 245 A (NOMURA SUSUMU ET AL) 30 September 1997 (1997-09-30) the whole document ---	1,3,5
X	US 5 617 391 A (NAGATOMO HIROYUKI ET AL) 1 April 1997 (1997-04-01) claims 1-6; figures 6,7 ---	1,3,5,6
X	DE 20 22 265 A (SIEMENS AG) 18 November 1971 (1971-11-18) the whole document ---	1,3,5
X	US 3 809 806 A (HARRIS W ET AL) 7 May 1974 (1974-05-07) claim 1; figures 1,5 --- -/--	1,3

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
5 April 2001	12/04/2001

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INTERNATIONAL SEARCH REPORT

Internal Application No
PCT/CZ 00/00053

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
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